A

Synopsis

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STUDIES ON EFFECT OF MINERAL FERTILIZERS AND ORGANIC MANURES ON GROWTH OF TURMERIC (Curcuma Longa L.).

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STUDIES ON EFFECT OF MINERAL FERTILIZERS AND ORGANIC MANURES ON GROWTH OF TURMERIC (Curcuma Longa L.).

INTRODUCTION :

Turmeric (*Curcuma longa L.)* is valuablespice of india. It is an herbaceous, perennial belonging to the family of Zingiberaceae, with a thick underground rhizome giving rise to primary and secondary rhizome called fingers. (mother rhizome, secondary and tertiary rhizome) **(**D.Amala *et.al*.2022**)**. Turmeric is closely related to human diets and hence the demand of organically grown turmeric is increasing tremendously worldwide (Fernanda*et.al.*2022). Turmericcarries a wide range of medicinal values such as a stomachic, blood purifier, antiseptic, inflammation and wound healing (G.Satish *et.al*.2009).

Turmericbeing a long duration crop and it extracts a lot of nutrients from the soil. After the enforcement of the green revolution in india, the use of chemical fertilizers for agriculture uses is increased day by day. But in the present era, there is a need for judicious and balanced use of chemical fertilizers. The injudicious use of these fertilizers creates the problem of the ecological balance of the environment as well as soil health. There is need to adopt the balanced use of organic manures, inorganic fertilizers and bio-fertilizers to maintain the ecological balance and better management of soil health (J.H. Kadam*et.al*.2020).

To maintain the soil health and sustainability for longer period, organic manures and other organic inorganic fertilizers are important. Intensification of crop production and sustainability of soil fertility status is the sole objective that can be achieved by these biological inputs, vermicompost are generally obtained by a non-thermophilic biodegradation of natural materials through association between earthworms and microorganisms (Bibhuti B. Sahoo *et.al.*2020). Humic Acid (HA) is a natural product can improve the physical, chemical and biological properties of soil. Humic acid is generally formed in senescent plant matter so it is important that plant trash from harvested crop is returned to the soil (SwarnaliDuary 2020). Combined application of different nutrientsresults in to high yield and quality rhizome. Application of organic and inorganic nutrient has various advantages like improving soil physical properties, water holding capacity and organic carbon content apart from supplying good quality of nutrients (Sumit Raizada *et.al.*2018). Nitrogen (N), phosphorous (P) and potassium (K) are the three major nutrients, which individually or together maintain growth, yield and quality of turmeric. N is involved in chlorophyll formation, and it influences stomatal conductance and photosynthetic efficiency. K regulates the permeability of cell walls activities of various mineral elements as well as neutralizing physiologically important organic acids. P indirectly promotes plant growth and absorption of K as well as other nutrients (Hikaru Akamine*et.al.*2007).

Organic manures and bio-fertilizers are the alternative source of plant nutrition.

REVIEW OF LITERATURE:

O.K. Chandravanshi*et.al*. 2021**:** Studied RBD design with three replications shows and theapplication of organic manuresand in organic fertilizers are found to be the best for achievinghighest turmeric growth, yield and quality.
NaserBoroomand*et.al*.2012: Studies indicates that N, P and K nutrients applied in some definite combination caused increase in yields rather than supplying ether of the major nutrients alone also depending on crop, the response to N, P and K application varied. (Crops used are: Cardamom, Ginger, pepper, Turmeric (*Curcuma longa L.)*.
Ivan Oyege*et.al.* 2023: Study shows that application vermi compost and their derived product in large-scale grain crop production offers several potential benefits. It is feasible and economically viable, particularly when combined with other organic sources and biofertilizers. Vermi compost has shown effectiveness in pest management, with promising results in controlling pests and aphids in cereal crops.
Rudra P.S.Gurjar *et.al.*2024: Experimental findings are, it can be concluded that the application of jeevamrut fortified with vermitea or neem cake is essential for improving the soil microbial activity and the available nutrient content also the highest fungal count and soil phosphorus was recorded.
K. Bhaskar *et.al*.2005: Treatments receiving humic acid (HA) in combination with NPK fertilizers recorded higher range of yield attributes with respect to number of mother, primary and secondary rhizomes. The weight of rhizomes of rhizomes of turmeric (*Curcuma longa L.*) was significantly influenced by the application of HA fertilizers and their interactions.

REVIEWS OF RESEARCH AND DEVELOPMENTS IN THE SUBJECT:

INTERNATIONAL STATUS:

Turmeric (*Curcuma longa L.*) is a condiment crop which has been used for colouring, flavoring and medicinal purposes. Turmeric occupies Prominent position among the spices production. In the area of export, turmeric occupies second position in terms of quality and fourth position in the export earning among the spices. Turmeric the golden spice is widely cultivated in different countries such as India. China, Myanmar, Nigeria, Bangladesh, Pakistan, Shri Lanka, Taiwan, Indonesiaetc. (Sarfraz Sheikh*et.al*.2014).

Recently turmeric (*Curcuma longa L.*) has been adopted into western medical and cosmetic practices.in the last decade, the leading exporters of turmeric were India, European Union (EU), United Arab Emirates (UAE), Bangladesh and China, whereas the primary importers included. Predominant producer of turmeric, contributing to 80% of the worldwide turmeric production volume. In 2020 worldwide turmeric production was approximately 1.1 million tons (MT) (Ly Nguyen *et.al*.2024). According to World Health Organization (WHO), about 80% of individuals from developed countries use the traditional medicine as a source of potential and powerful drugs that are derived from medicinal plants (Sayantani Chanda *et.al*.2019).

NATIONAL STATUS:

Indian turmeric (*Curcuma longa L.*) is considered to be the best in the world. South India and State of Tamil Nadu, is the world's largest producer of turmeric and the most important trading centre for turmeric. It is also known as "Yellow City", "Turmeric City" or "Textile City". Sangli a city of Maharashtra is second only to Erode in size and importance as a production and trading site for turmeric (Kalariya R.P. *et.al.*2022).

The area under turmeric cultivation and quality of Turmeric (*Curcuma longa L.*) production of major turmeric growing states in india are andhra pradesh, Tamil Nadu, Orissa, West Bengal, Maharashtra, Karnataka, Kerla. The average result indicates that Maharashtra produces the maximum quantity and also has the largest area of turmeric cultivation. Next to it are Tamil Nadu and Orissa as significant turmeric cultivation states in india

(Dr. K. Thiripurasundari *et.al.*2014).

ORIGIN OF RESEARCH PROBLEM AND SIGNIFICANCE OF THE STUDY:

Turmeric requires heavy manuring. Nirogen (N) and Potassium (K) are two important fertilizers responsible for boosting growth and yield of turmeric. Productivity of turmeric and its quality also enhanced by application of organic manure.

Application of mineral fertilizers (NPK) without organic matter input can accelerate humus mineralization and soil quality degradation with all negative consequences such as nitrogen leaching, higher availability of toxic element for plants and slow energy for microorganisms. Application of organic manures help to achieve the long term stable yields in turmeric and maintaining soil at optimum quality. The combine application of mineral and organic manure amendments is more beneficial for growth and yield in turmeric and enhancing soil fertility and maintaining sustainability than single application of mineral fertilizers or organic manure.

So the present study undertaken to study the effect of mineral (NPK) and organic manure (farmyard manure, vermi compost, Jeevamurt, Turmeric buster on growth, physiology and yield of turmeric and microbial activities of soil.

OBJECTIVES:

1. To avoid more use of chemical fertilizers and maintain the soil fertility and productivity of turmeric crop plant with the help of organic manures.

2. To assess the combine effect of mineral nutrients (NPK) and organic manure (farmyard manure, vermi compost, Jeevamurt, humic acid and Turmeric buster) on growth, physiology and yield of turmeric and soil fertility.

3. To study the effect of mineral (NPK) and organic manure (farmyard manure, vermi compost, Jeevamurt, Turmeric buster) on enzyme activities of soil.

4. To study physiology characters chlorophyll content, essential oil, oleoresin and curcumin content, leaf NPK (Nitrogen, Phosphorous, Potassium) and micronutrients.

5. To increase the nutrient content of soil micro flora by using organic manure.

6. To study the individuals and interactive effect of mineral nutrients and organic manure on turmeric crop plant.

The findings from the present studies provide best tool for the farmers for the sustainable farming.

METHODOLOGY:

1.Collection of healthy and diseased free rhizomes of turmeric crop plant

2.Selection of grow bag / experiment field site.

3.Collection of soil sample and analysis before sowing of rhizome.

4.Study of mineral nutrients and organic manure on the vegetative growth and yield of Turmeric.

a. Plant height

b. No. of leaves per plant

c. Leaf area

d. No of tiller per plant etc.

d. Mother rhizomes, primary rhizomes, secondary rhizomes and tertiary rhizomes.

5. To study the effect of mineral nutrients and organic manures on physiology of Turmeric.

a. chlorophyll content

b. essential oil, oleoresin and curcumin content

c. leaf NPK (Nitrogen, Phosphorous, Potassium)

d. micronutrients

6.To study the enzyme activity of soil enzyme.

a. Urease

b. Invertase

c. Catalase

d. Phosphatase

7.Soil sample collection and analysis after harvesting of Turmeric.

PROPOSED WORK PLAN/ FORMULATION AND STRUCTURE OF STUDY:

YEARS	PROPOSED RESEARCH WORK
1st YEAR	Collection and study of research paper and review of literature
	Selection of variety of Turmeric which is suitable for Nanded, Parbhani and Hingoli and turmeric growing regions.
	Selection of Grow bag /Field experimental site.
	Collection of healthy and disease-free rhizomes for sowing.
	Farmyard manure (FYM), vermicompost, Jeevamrut, turmeric booster and humic acid.
	Visit to agriculture university, KVK, research station and institute for gathering information related to research work.
2nd YEAR	Soil analysis before sowing of turmeric.
	Field preparation and Experimental design.
	Analyzing of Mineral nutrients and organic manures effect on vegetative growth of Turmeric
	To study effect of mineral nutrients (NPK) and organic manure (farmyard manure, vermi compost, Jeevamurt, Turmeric buster) on physiology of turmeric (chlorophyll-a, chlorophyll-b, proteins, essential oils, oleoresin and curcumin content etc.)
	To study effect of mineral nutrients (NPK) and organic manure (farmyard manure, vermi compost, Jeevamurt, Turmeric buster) on vegetative growth of turmeric (Plant height, No. of Leaves Per Plant, Leaf Area, Leaf Area Index and No of Tiller per plant etc.)
	To study effect of mineral nutrients (NPK) and organic manure (farmyard manure, vermi compost, Jeevamurt, Turmeric buster) on enzyme activity (Urease, Invertase, Catalase and Phosphatase.)
3rd YEAR	Soil analysis after harvesting of turmeric.
	Experimental result analysis and application of statistical method.
	Chapterwise writing of research work.
	Submission of Thesis.

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